Taking a Cut:
Investigating incentives in Indonesia's medicine supply chain

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for the MedsWatch Indonesian Supply Chain Research Team.

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Introduction

Indonesia, the world's fourth most populous nation, has vastly expanded its national health insurance since 2014; it now undertakes to provide free medicine to 230 million people, over 80% of citizens.(BPJS Kesehatan 2020) Procurement policies that prioritise low cost over quality aim to increase access to these free medicines without increasing the system's deficit, last reported at US$2.2 billion. However, the policies have raised concerns, magnified by several recent scandals, that UHC is expanding access to substandard medicines in the public sector.(Hasnida, Kok, and Pisani 2021) At the same time, many areas of the country still have extremely limited access to any public health services; those that do exist are often inconvenient to attend, or are short of medicines.(Gani and Budiharsana 2019)

This combination of restricted access and low perceived quality means that many people, out of preference or need, continue to buy medicines through private channels.

Indonesians are unevenly distributed across more than 6,000 inhabited islands in three time zones. While the national health insurance scheme, JKN, is centralised, responsibility for providing health services is devolved to 514 district governments. In March 2021, there were 12,738 authorised pharmaceutical products on the market, from 175 domestic and 75 foreign manufacturers, and 2,081 registered medicine distributors. (Badan Pengawas Obat dan Makanan - Republik Indonesia 2021)

This makes for a complex market, and a long (and sometimes costly) supply chain. Our earlier research suggested that falsified medicines are most likely to be found where there are shortages of affordable quality-assured medicine, and/or where service providers or patients source medicines outside of the regulated supply chain. A subset of illegally repackaged medicines are most likely to be found where price differentials between therapeutically equivalent products are extremely large, and where due diligence procedures are lax. Substandard medicines, meanwhile, may be more common where medicines are free to the consumer, or the price paid by the procurer or consumer is irrationally low. Degradation is expected to cluster where distribution margins do not match the true cost of quality-assured supply to a particular destination. (Hasnida, Kok, and Pisani 2021)

In this research, undertaken with funding from the Global Health Supply Chain Conference and incorporating data and insights from researchers supported by Australia's National Health and Medical Research Council, and United States Pharmacopeia Quality Institute, we investigate how different actors in the medicine supply chain (from manufacturers to patients) respond to market incentives, and how those incentives might affect the availability of medicines and their quality. Our investigation was guided by the following questions:

- What is the structure of medicine distribution in Indonesia?
- What is the value chain? How much profit is extracted at each level of the supply chain?
- What are the major determinants of profit margins for distributors at different levels of the supply chain?
- How do these interact with the determinants of profit margins for health care providers?
- Which (dis)incentives or opportunities/obstacles to extracting profit are most likely to result in shortages?

- Which (dis)incentives or opportunities/obstacles to extracting profit are most likely to result in poor distribution practice?
- To what extent do distribution practices and value extraction vary by manufacturer, product, or outlet type, or price point?

Methods

Study location

We conducted the study in two Indonesian provinces: East Java and Nusa Tenggara Timur, or NTT (pronounced EnTayTay). In East Java, one of the most developed and populous provinces in Indonesia, the research was embedded in an ongoing study of the quality of cardiovascular medicines conducted in Malang District, a semi-rural district situated close to the major city of Malang. Nusa Tenggara Timor (NTT), by contrast, is one of the poorest and most remote provinces of Indonesia. In NTT, we collected data principally in the rural Timor Tengah Selatan or TTS (pronounced TayTayEs) district, with some additional work in the provincial capital Kupang. In addition, we supplemented pricing data with nationally-representative market data collected in another ongoing study.

Literature review and scoping interviews

We reviewed published and grey literature, press reports and industry blogs in Indonesian and English. We held an initial scoping meeting and conducted a number of informal interviews with trusted informants currently or formerly involved in the production, sale, distribution, procurement, or dispensing of medicines in Indonesia. From these materials, we developed a framework which outlined the motivations and goals of different actors in the supply chain, the actions they take to meet those goals, and the implication of those actions for medicine quality, validating it in a more formal meeting with actors from all across the supply chain. We asked participants to help fill in any conceptual gaps, and to provide guidance for key questions and focus for the field data collection phases.

Quantitative data collection

Facility data

We collected full pricing and sales or consumption data on amlodipine and simvastatin across a number of different supply chain and service delivery actors in the study areas. In addition, pricing and sales data for amoxicillin were collected in NTT; and the same data were collected for captopril, furosemide and glibenclamide in Malang. We provided sites (distributors, pharmacies, district warehouse, health facilities) with a standardised spreadsheet to help them record sales/dispensing volumes and buying and selling prices for each brand and dosage of the target medicines. Where data contributors preferred to give us printouts from their stock management systems, we entered those data into our spreadsheets to ensure a standard format.

Table 1 shows the types of supply chain actors/facilities that provided quantitative data, by location, along with the total number of different variations of study medicines recorded by each outlet type.

Table 1: Source of quantitative data, and number of products recorded

	Malang		NTT	
	Facilities	Brands*	Facilities	Brands**
Distributors	1	12	0	0
Pharmacies	2	24	3	28
Private clinics	0	0	1	8
Public primary clinics (puskesmas)	4	5	0	0
District medicine warehouse	1	5	1	3
Public hospital	1	12	1	3
Private Hospital	0	0	1	4
Total	**9**	**58**	**6**	**46**

*Total number of product variations (brand or INN manufacturer and dosage form) of 5 medicines: amlodipine, captopril, furosemide, glibenclamide, simvastatin
** Total number of product variations (brand or INN manufacturer and dosage form) of 3 medicines: amlodipine, simvastatin, amoxicillin

Mystery shopper data

In addition to the facility data, we used data from "mystery shopper" surveys embedded in our sister research projects. In these surveys, medicines were purchased directly from pharmacies or other providers by researchers posing as patients, allowing us to ascertain the actual retail price paid by patients. As Table 2 shows, the mystery shopper survey was far more extensive in Malang, where the sample frame reflected the estimated patient exposure to a particular brand and outlet. In NTT, products were sampled according to an index of likely risk. The details of sampling methods will be reported in detail elsewhere.

Table 2: Number of samples and brands included in through mystery shopper surveys.

	Malang		NTT	
	Samples	Brands	Samples	Brands
Amoxicillin	34	26	14	7
Amlodipine	88	30	8	6
Captopril	22	5	0	0
Furosemide	21	8	0	0
Glibenclamide	20	6	0	0
Simvastatin	52	18	0	0

Qualitative data

We conducted in-depth interviews with purposively-selected respondents involved in the procurement, distribution, sale and dispensing of medicines in the study areas. All interviews, including those with national distributors, were conducted in the study districts; we were unable to secure interviews with representatives of manufacturers or distributors at their Jakarta headquarters.

Interviews were conducted in Indonesian or Javanese and were recorded, with the interviewees knowledge and written consent. They were transcribed in Indonesian. Most lasted between 60 and 90 minutes.

Table 3: Interviewees by location and job description.

Institutions	Occupation	NTT	Malang	Total
National distributor, state-owned	Manager	1		1
National distributor, private	Manager	1		1
Local distributor, private	Manager		2	2
Bulk-sales pharmacy	Pharmacist in charge	1		
Independent pharmacy	Pharmacist in charge	3	2	5
Chain pharmacy	Pharmacist in charge	1	3	4
Public Hospital	Head of pharmacy section	2	1	2
Public Hospital	Procurement Staff	3		2
Private Hospital	Pharmacist in charge	1		1
Independent health workers	GP/nurse/midwife	1	3	4
Drugstore*	Owner of the store	1		1
Primary Health Centre (puskesmas)	Pharmacist in charge	2	6	8
District Health Office	Head of pharmacy section	1	1	2
District Health Office	Head of district warehouse	1	1	2
District Health Office	Procurement staff	1		1
	Total	*20*	*19*	*39*

*Not licensed to sell prescription medicines

Ethical clearance for data collection in NTT was obtained from the Faculty of Medicine at the University of Gajah Mada, in Yogyakarta, where one of the research team is based. Ethics approval for data collection in Malang, East Java, was obtained from the Faculty of Medicine at the University of Brawijaya, Malang, and the University of New South Wales, Sydney, which is the sponsor of the larger study in which the Malang data collection was nested. Ethics approval for the risk flagging study, which contributed the secondary market data, was obtained from Faculty of Medicine at the University of Indonesia.

Results

Structure of the pharmaceutical market

Since 2014, Indonesia has been expanding a single-payer national health insurance mechanism known as Jaminan Kesehatan National or JKN. A detailed description of the procurement, payment and supply mechanisms is beyond the scope of this paper, but a few key points about the public system are important for the analysis that follows.

- JKN patients are entitled to free medication for almost all conditions, as long as they follow the correct referral pathways.
- Public facilities mostly access medicines for JKN patients through the public procurement platform known as e-catalog. Supply models vary across Indonesia's 514 districts. The district health office usually consolidates demand from primary facilities

(*puskesmas*, in Indonesian) and procures medicines through e-catalog (although puskesmas are increasingly encouraged to procure from e-catalog themselves). Distributors deliver e-catalog medicines to the district medicine stores, which then deliver them to facilities.

- Hospitals (public and private) may procure directly from e-catalog to meet JKN patient needs. They are reimbursed by diagnostic group and not against receipts for the medicine itself. Primary health centres may use capitation funds to buy medicines independently if the district health stores cannot meet their needs.
- If they cannot get what they need through e-catalog, district health offices may procure directly from an appointed distributor if the total ceiling price for the desired 'packet' of medicines is under IDR 20 million (US$1,400). Above that threshold, they must issue a tender.
- For some chronic conditions, JKN patients can pick up medicines directly from collaborating pharmacies, using repeat prescriptions. The pharmacy is reimbursed at a fixed price, regardless of the real cost of the medicine.
- E-catalog medicines are ordered from manufacturers but delivered by distributors.

Indonesia's pharmaceutical supply chain(s)

Indonesia's vast and complex market for pharmaceuticals is served through two major types of distributors.

Nationally integrated distribution networks
Nationally integrated suppliers are often but not always vertically integrated with large producers, and sometimes also with retail pharmacy networks. A prominent example is the state-owned Kimia Farma network, which encompasses production, distribution and retail. Products travel from the producer to a designated national distributor, which passes products on through its national branch offices to the district warehouse, hospital or pharmacy which procured the medicine. Even when they are vertically integrated with a major producer, national distributors may also be designated as the sole distributors by other pharmaceutical companies. A high proportion of the medicines procured through e-catalog use national distributors.

By keeping products within a single company-owned distribution chain throughout their (often long) journey throughout the archipelago, national distributors are able to pay a one-time distribution fee (reported by one national producer to be 7% of the ex-factory list price) and to avoid the repeated addition of a 10% value added tax to traded medicines.

Multi-step distribution chains
Alternatively, products pass through a number of distributors and/or sub-distributors before being sold to hospitals or pharmacies. This is especially true of products from smaller manufacturers, and those destined for markets outside Sumatra, Java, Bali and South Sulawesi, which form the main arteries of most of the national distribution chains.(Badan Pengawas Obat dan Makanan - Republik Indonesia 2020)

Data from district public procurement offices (portal at https://lpse.lkpp.go.id/) shows that these smaller and more local distributors also frequently supply district governments with medicines procured outside of the e-catalog process. This parallel public procurement may take place because required medicines are not included in e-catalog, or because distributors are unable or unwilling to supply to the bidding entity.

Each turnover between distributors increases the total burden of value added tax.

Informal distribution: the end of the chain
Strictly speaking, pharmacies are only allowed to source medicines from registered distributors, while Indonesian patients can legally access prescription medicines from only a limited number of sources. These are:

- a registered primary health facility (public or private), with a resident pharmacist
- a registered hospital (public or private)
- a registered pharmacy (chain, independent or internet -- the latter are usually the on-line sales outlets of large chain pharmacies).

In practice, many patients buy medicines directly from doctors, nurses, midwives, and drugstores or internet shops that are not licensed to sell prescription medicines. While regulations provide some leeway for sales by licensed health providers such as midwives in very remote areas, the practice is not confined to those areas.

In addition, we found that many smaller pharmacies source stock from larger pharmacies, as described in section 1h below.

Supply chain regulation

Indonesia has strict regulations around who is and is not allowed to procure and sell medicines of different types, clear registration requirements for supply chain actors (for example the requirement that any facility dispensing medicines has a pharmacist-in-charge), detailed guidance governing good distribution practice, and clear protocols for the return and destruction of expired medicines. *De jure*, the medicine supply chain in Indonesia is well regulated.

This on-paper regulation is often at considerable variance with practice. So much so, that there is a whole vocabulary describing *de facto* supply chain practices which are technically illegal. The *de facto* practices have in some cases arisen because of the way *de jure* regulations incentivise the behaviours of different actors in the supply chain. We describe many of these practices throughout this report, and reflect on the implication of the difference between what is required on paper and what happens in practice in our conclusions.

Incentives for supply chain actors

We found three major types of incentives shaping the behaviour of actors in the supply chain, from producer to patients. These may be categorised as financial, institutional and health related. Here, we describe each of these, illustrating the behaviours or pricing decisions they influence, and describing the outcomes for medicine access and quality. We recognise that these factors interact, and that different incentives may produce similar risks to medicine quality.

1 Financial incentives

The provision of medicines is, above all, a business. Companies and individuals involved in the private sector manufacture, distribution, prescription and dispensing of medicines are generally seeking to maximise their profits, usually within the range allowed by the law and the protection of reputation. Maximising profits implies achieving the greatest difference between revenues and costs. Most actors in the medicine supply chain, at least in the private sector, are thus trying to acquire (or in the case of producers, manufacture) medicines at the lowest feasible cost, while selling them at the highest cost a client will bear. For a given level of costs, increased profits may be achieved by increasing the overall volume of products sold with a given profit margin, increasing the profit margin on a given volume of sale, or by increasing both volumes and margins. In any value chain, actions that increase revenues for

one actor also increase costs for the next actor in the chain. We found that the most influential alignment of interests thus occurred when actions taken by one actor to minimises losses simultaneously reduced costs or increased profit opportunities for the next actor in the chain.

Financial incentives: Actions that minimise losses

1a) Discounting of over-stocked products

Practised by: Manufacturers, distributors

If medicines are not used within a certain period, they may become ineffective or toxic. They thus carry expiry dates; if they are not consumed before that date, they must be safely disposed of. Industry norms, and in some cases regulations, allow or oblige expired medicines to be returned to distributors and/or manufacturers for disposal. Medicines close to their expiry date thus represent two types of potential losses: sales foregone, and the cost of return and disposal. Because of this, manufacturers and distributors are both keen to shift stock as it approaches its expiry date.

National and local distributors and pharmacists all described the widespread practice of deep discounting of over-stocked medicines close to expiry, in order to avoid the cost of sales forgone.

If we've got a lot of stock, we suggest a [promotional] program so that there's not too much expiry... If there's only a year left (on the expiry date) we will discount 50%, as long as there some profit, or even just a small loss.... It's better to sell at a small loss than to let it die in the warehouse and suffer a great big loss.

-- Panel pharmacy, Kupang

In some cases, distributors simultaneously protected themselves against the potential cost of processing returns by stipulating that these discounted products are not eligible for returns.

"If we've already given a big discount, and also for BPJS [e-catalog] medicines, we don't accept returns. We've already paid out a lot [for distribution] and they still want to send it back?!"

-- Distributor, national

Quality risks: While pharmacists said they were likely to accept such discounts only for fast-moving medicines which they were confident they could sell, this practice carries the risk that expired and potentially degraded products may remain on the shelves and be sold to patients. A secondary risk is that unethical traders, especially those who supply the informal supply chain, may repackage expired medicines to appear as though they remain within their authorised sales period. In the field survey, we found medicines whose expiry date could be removed with the wipe of a finger.

"There are people selling amoxicillin in village [market stalls]... What worries me is that these are expired medicines that haven't been properly disposed of, and just repackaged. ... It's so easy with the technology now."

-- Pharmacist, public sector, TTS

1b) Sourcing of 'irrationally' cheap products

Practised by: Providers of health care to JKN patients, or poor patients

Most traders will seek to buy products as cheaply as they can, as long as they are confident that the product meets their expectations for quality. However, some actors in the Indonesian health system are actively incentivised to seek medicines at prices that appear irrationally low

for a quality-assured product. Hospitals providing services to JKN patients are expected to provide medicines for free, paying for them out of the amount reimbursed for the diagnostic group. Pharmacies give out "repeat prescription" medicines free, and are reimbursed a fixed amount. Primary health centres may use capitation funds to buy medicines which are not provided from the district medical stores, often because of stockouts.

In all of these cases, the revenue is fixed (and usually very constrained), while the cost of acquiring the medicines varies. Compensation is generally calculated on the basis of e-catalog prices; these are commonly far below the market median for the same products. As Table 4 shows, we found for example, that across 12 dosages of 6 common essential medicines, the market median price was more than double the public procurement price for all but 3 products. For over half of the products, the median price was over three times the e-catalog price.

Table 5: Comparison of average public procurement price to market median price

Medicine	Dose and form	E-catalog price	Median price	Ratio
Amlodipine	10mg tablet	93	2347	25.2
Amlodipine	5mg tablet	72	1500	20.8
Amoxicillin	125mg/ml syrup	163	489	3.0
Amoxicillin	250mg/ml syrup	292	1441	4.9
Amoxicillin	250mg tablet	193	355	1.8
Amoxicillin	500mg tablet	238	626	2.6
Captopril	12.5mg tablet	64	143	2.2
Captopril	25mg tablet	78	266	3.4
Furosemide	40mg tablet	78	133	1.7
Glibenclamide	5mg tablet	126	150	1.2
Simvastatin	10mg tablet	110	743	6.8
Simvastatin	20mg tablet	213	868	4.1

Source: E-catalog data, LKPP. Market data, IQVIA.

If they cannot access e-catalog products, facilities risk suffering active losses by serving JKN patients. These losses occur if facilities pay more to provide services plus medicine than they get in capitation/ reimbursement. They are thus incentivised not to serve those patients (as described in 1c) or to find the very cheapest supplier possible.

"We had proposals from lots of distributors to supply the health centre. Usually the procurement team compares their price proposals, and it turns out [Distributor A] was the cheapest, so we appointed [Distributor A]"

-- Puskesmas pharmacist, Malang

This is likely to include suppliers who are cutting losses through discounting, as described in 1a) above.

A similar dynamic was reported by some health care providers who are selling medicines informally in the "last mile" of the supply chain. When providing services to poor patients in very remote areas, midwives and nurses commonly charge a small fee that includes service provision and medicine (something that all fee-paying customers reportedly expect to receive, regardless of actual need).

"At my [medical] practice, I charged 20,000 rupiah [then US$ 1.70], including medicine, which cost up to 15,000. I pay a fixed price to the salesman for that, and maybe get a gimmick like a ballpoint pen or notebook. It's impossible [to make a living]."

-- Health care provider, Malang

To avoid real losses, these service providers will source the medicines as cheaply as they can.

Quality risks: In acquiring medicines at prices below the often very low income that they get from the national insurer or from poorer patients, facilities and health care providers sometimes turn a blind eye to due diligence, buying products whose provenance can not be verified. This opens the door to products that may be diverted, degraded or expired, as well as providing a market for products whose sale price appears, in comparison with other unbranded generic products on the market, to be priced so low that it is hard to imagine how the cost of quality assurance is covered.

1c) Refusal to supply products

Practiced by: manufacturers, distributors, providers of health services to JKN patients

Supply chain actors will sometimes protect themselves from losses by refusing to supply low-cost products. This operates differently for different actors.

The JKN system covers over 220 million Indonesians, at least on paper. Most of the medicines for those patients are procured through e-catalog, the public procurement platform, which selects one supplier per province. Bidders must hold a market authorisation (valid for five years after approval of the dossier), which is assumed to guarantee quality. They must also undertake to supply volumes equivalent to the ministry of health's demand forecast, and must bid below a ceiling price set by the ministry of health, using a formula that is not public. Beyond that, product selection is currently made on lowest price alone.

Table 6 Estimated demand for products in areas where no company bid successfully to supply e-catalog products, 2018

Molecule	Dosage, form	Estimated unmet demand (Counting units)
amoxicillin	500mg tablet	598,394,368
ampicillin	1000 ml vial	2,813,816
cefixime	100mg tablet	64,202,608
clindamycin	300mg tablet	21,529,398
domperidone	5ml liquid	129,676
ethambutol	500mg tablet	25,374,616
loperamide	2mg tablet	21,728,884
loratadine	10mg tablet	33,377,290
mefenamic acid	250mg tablet	17,303,408
metformin	500mg tablet	310,519,456
nifedipine	10mg tablet	33,740,776
propylthiouracil	100mg tablet	22,740,012
ranitidine	150mg tablet	126,151,152
sodium bicarbonate	500mg tablet	18,649,908
sucralfate	500mg tablet	9,440,184

Source: LKPP

Sometimes, the ceiling price set by the government is so low that no company will bid at all. Table 6 shows the projected demand for a number of products for which there were no bidders in the initial round of the 2018 e-catalog, which remains largely in force.

Where an auction fails and no e-catalog products are available, providers of services to JKN patients must buy products on what is termed the "regular" market. As Table 5 showed, regular market prices are generally far higher than e-catalog prices, so this works to a manufacturer's advantage, as long as all competitors also fail to bid.

Failed auctions are relatively unusual. The three most populous provinces (which are all in Java and also have the most advanced health services) each have populations of over 30 million people; in the winner-takes-all e-catalog system, companies are thus strongly incentivised to submit low bids for these provinces, in order to avoid being shut out of the largest markets. Since participation in e-catalog guarantees huge sales volumes in these provinces, and they are also among the areas where most medicines are produced, bidders often propose prices that can at best provide them with gossamer-thin profit margins. This affects prices nationwide, because prices in even the most remote regions are capped at a maximum of 20% higher than the lowest winning price.

Over 90% of active ingredients for medicines made in Indonesia are imported; they are largely paid for in US dollars. If the price of active ingredients rises (for example because of the supply shocks occasioned by the COVID-19 pandemic) or the value of the rupiah falls, the very narrow margins earned on e-catalog products are easily eradicated, and selling medicines at public procurement prices becomes a loss-making activity. In an open letter to health authorities, the head of the Indonesian pharmaceutical manufacturers association, GP Farmasi, complained that the price per kg of imported paracetamol rose by 93% between late 2017 (when current e-catalog price bidding took place) and March 2020.(Tirtokoesnadi 2020) Some producers react by simply halting production of e-catalog products.

"[E-catalog] auction winners are supposed to ensure that they can meet demand from government hospitals, even if it is in Eastern Indonesia, where the prices are different than in Java. But once they've won the tender, then suddenly they say 'oh, we can't get raw materials any more'. They all want to win the tender, but then they shouldn't be allowed to say they've run out of API ...There should be sanctions for e-catalog winners [who don't produce enough to fulfil orders] so that they think twice before bidding."

-- Pharmacist, Public sector 2, TTS

Public procurement agency LKPP has the right to impose sanctions for non-delivery of medicines through e-catalog, but there is no record of it doing so. Indeed, even where products are available, distributors sometimes selectively refuse to fulfil orders. There are two reasons for this. The first is that the maximum price variation between districts, which amounts to a potential distribution margin, is regulated. LKPP divides Indonesia into 5 zones for the purposes of pricing. The e-catalog price in each zone is for delivery to the district level -- a journey that may involve sea transport across three time zones and up to 4,400 kms.[1] Yet the ceiling price of products in the most remote (and sparsely populated) provinces is limited to 20% more than the ceiling price in populous Java. For low-value products, this may represent a very small amount in real terms, and will in many cases not cover the fee paid to distributors for delivery to remote areas, let alone the real costs of transport.

[1] An exception is the Easternmost province of Papua, where the price includes only delivery to the provincial warehouse.

"Actually, a product that costs 100 there [in Java] can cost 700 here [in TTS], with container shipment that takes two weeks, maybe a month if the weather is bad"

-- Panel pharmacy, Kupang

It is thus in the interests of both producers and distributors to prioritise sales to lower-cost, higher volume destinations.

Since distribution fees tend to be based on product value, it is also generally more profitable to distribute higher-value products, making many e-catalog products relatively unattractive even in easy-to-reach areas, especially if the order is small.

"The government says we should order through e-catalog, but sometimes the distributor doesn't want to supply puskesmas, because our orders are small --different from when the district health office clicks [to order], right? It's like they'll lose out on the delivery costs or something. So in the end we just buy from an appointed distributor."

-- Puskesmas pharmacist, Malang

A national distributor explained the logic behind selective reluctance to supply.

"It's business logic. [INN] generics are cheap, and the distribution fee we get from the producer is based on the value. Seven percent. And imagine, out of that I also have to cover customers that don't pay"

-- Distributor, national

The comment hints at the second reason distributors reported refusing to supply e-catalog medicines (and indeed other medicines): because clients had not paid for previous shipments.

"*When an order comes in on the system, it gets checked by the supervisor before we issue a PO [faktur]. If the buyer is in debt to us, it's an automatic 'reject, cancel.' They have to pay their debts first. "*

-- Distributor, national

Hospitals in turn complain that they cannot pay distributors because the public insurer delays payments and reimbursement for JKN patients, leaving hospitals with no cash on hand. In 2018 GP Farmasi reported that this had caused a backlog of IDR 3.5 trillion in unpaid bills to distributors and manufacturers.(GP Farmasi 2018)

The procurement officer in TTS district health office reported that they had submitted 6 procurement requests through e-catalog. Not one of them was fulfilled. While he explained this as a problem of errors in bureaucratic process, a major distributor in the province said that the district was notorious for late payment, so distributors were reluctant to fulfil orders and expose themselves to losses.

"We have payment challenges with all the public hospitals and district health offices [in this region]"

-- Distributor, national

"We serve many BPJS clients, and [public] hospitals, well, you know, there's no way they're going to pay cash. Usually the payment gets put off... If we've given them 90 days to pay and they still don't pay, we won't serve them again."

-- Distributor, national

State-owned distributors report being particularly hard hit, because public sector clients assume they will write off debts, even though the companies are run for profit, and required to pay dividends to the government.

"It's as though because we're state-owned, [public hospitals] think it's fine for us to operate at a loss, but that's just not true."

-- Distributor, national

State facilities are not alone in being slow to pay. One private sector distributor reported that companies work together to maintain blacklists of pharmacies that are slow to pay.

There are several pharmacies who are known to have cash-flow problems, and don't pay their bills for months and months. All the distributors around will let one another know: "Be careful of that one, they owe me x amount," so [that pharmacy] goes on the blacklist. They'll only get goods if they pay cash on delivery.

-- Distributor; Malang.

Quality risks: When orders placed through the public procurement system are not fulfilled, shortages often arise. Shortages may lead institutions to search for medicines outside of the regulated supply chain; where they are replacing e-catalog products they will need to find very cheap alternatives, running the risks described in 1b) above. Shortages at public facilities also increase out of pocket expenses for patients, or oblige them to do without medicine entirely.

When private pharmacies are blacklisted by reputable distributors for non-payment, they may buy product from unregulated sources, increasing the likelihood of buying stolen or falsified medicines.

The public procurement platform does not record unfulfilled orders, and demand planning is not always accurate. However, a comparison of fulfilled orders against planned demand may provide an idea of the extent to which the public procurement system matches planned demand.

As Table 7 shows, the variance in the fulfilment ratio was wide. North Kalimantan, which procured 60% more than its demand forecast across the 6 study molecules, was the only province to exceed its plans. Other provinces procured between 20 and 96% of their expected demand, with 12 provinces falling short by 50% or more. This include East Java and West Java, the country's two most populous provinces, which are home to a significant proportion of the pharmaceutical industry. This surprised us. Equally surprising was the high fulfilment ratio is some relatively remote provinces, including the country's two most recently established provinces.

This could be explained by differences in expected health facility usage. Since the medicines we looked at include five common medicines for cardiovascular disease and diabetes, as well as a common antibiotic, and prevalence of the indicated conditions does not vary greatly across the nation, we further calculated per capita demand projections. The results highlight outliers such as Maluku and Papua Barat, where projected demand was very high despite access to health services being extremely limited. In these cases, apparent "unmet demand" is more likely to signal over-estimation of need than a market opportunity.

Table 7: % demand forecast fulfilled through e-catalog, 6 molecules, 2018

Province	Fulfilled volume	Demand forecast	Fulfilment ratio	Demand per JKN patient
Aceh	28,782,165	141,390,221	0.20	29.3
Sumatera Utara	52,575,547	69,758,401	0.75	9.8
Sumatera Barat	19,565,010	37,656,734	0.52	10.6
Riau	26,317,467	29,416,391	0.89	8.3
Jambi	14,699,681	28,687,682	0.51	17.6
Sumatera Selatan	23,605,912	36,586,162	0.65	5.3
Bengkulu	9,319,724	15,331,622	0.61	14.4
Lampung	25,295,840	54,860,563	0.46	12.6
Bangka Belitung	4,615,212	7,806,386	0.59	8.3
Kep. Riau	6,698,195	13,919,633	0.48	12.0
Jakarta	42,751,017	68,470,407	0.62	8.5
Jawa Barat	106,673,018	233,923,121	0.46	8.6
Jawa Tengah	77,519,643	150,682,265	0.51	6.9
Yogyakarta	16,756,468	26,707,639	0.63	9.1
Jawa Timur	89,522,184	185,708,460	0.48	8.3
Banten	32,778,223	43,463,288	0.75	6.2
Bali	11,807,241	40,859,344	0.29	16.2
NTB	13,810,154	38,233,994	0.36	14.0
NTT	22,812,781	38,476,655	0.59	11.6
Kalimantan Barat	13,020,160	35,378,083	0.37	16.6
Kalimantan Tengah	8,867,005	10,227,841	0.87	7.1
Kalimantan Selatan	14,869,803	24,738,353	0.60	9.4
Kalimantan Timur	17,577,792	26,756,447	0.66	11.5
Kalimantan Utara	5,674,410	3,473,915	1.63	6.5
Sulawesi Utara	16,681,776	35,991,194	0.46	22.4
Sulawesi Tengah	15,685,560	28,589,532	0.55	16.0
Sulawesi Selatan	26,925,833	92,937,794	0.29	15.3
Sulawesi Tenggara	12,330,046	15,809,718	0.78	9.8
Gorontalo	5,336,671	8,834,461	0.60	10.1
Sulawesi Barat	8,283,499	8,663,919	0.96	7.9
Maluku	10,193,380	31,106,034	0.33	33.7
Maluku Utara	5,485,222	8,750,749	0.63	11.4
Papua Barat	4,207,478	14,591,643	0.29	22.4
Papua	18,422,093	20,724,023	0.89	7.7

Financial incentives: Actions that maximise profits

1d) Market segmentation

Practiced by: producers

While the procurement agency LKPP does buy some patented medicines through negotiation, most medicines on e-catalog are generics that use international non-proprietary names (INN medicines). INN medicines are also the "brand" of choice for poor patients who can not access free JKN medicines. However, INN medicines (and those provided free by JKN in particular) are widely perceived to be of poor quality. Many Indonesians are able and willing to pay more for products that they perceive to be of higher quality.

"It's like: you use the same petrol, but your motorbike is a different brand... It's just the tradition around here, patients prefer branded medicine to generics. Even though the medicine is the same, we get "Paracetamol doesn't suit me, only Sanmol [brand] works for me", though it's the same ingredients, and one is 25,000 [rupiah] and the other 85.000."

-- Pharmacist, Public sector 2 TTS

Patient preference is explore further under "Up-selling" in 1e) below. Manufacturers will take advantage of different willingness to pay by creating subsidiary companies and/or producing a variety of brands that target different segments of the market, at different price points.

" Like [large private firm] Kalbe Farma; they sell generics only through their subsidiary [Hexpharm Jaya], while the state-owned companies concentrate on generics, and only sell branded products to mop up the mid-to-high end. If you look at the market, you see that Kalbe dominates. It's a successful strategy."

-- Panel pharmacy, Kupang

Figure 1 shows the Net Pharmacy Price (Harga Netto Apotek or HNA, the list price for sales to pharmacies) for different brands of a single product, the cardiovascular medicine Amlodipine in a 5mg dosage, sold by four Indonesian pharmaceutical holding companies. These are among the firms that create subsidiary companies and brands in order to expand their market across consumers with different ability or willingness to pay.

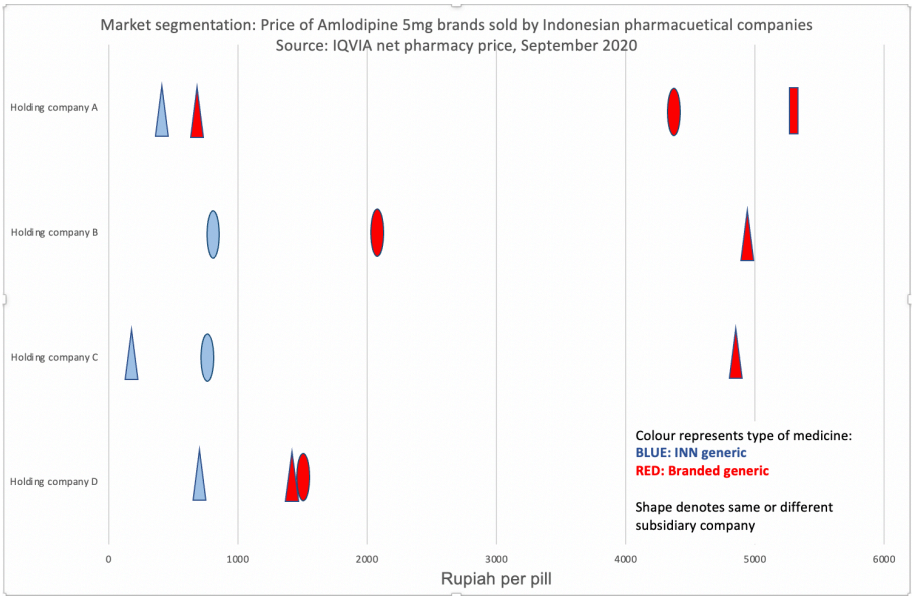

Figure 1

The same holding company may price their most expensive brand at many multiples of the price charged for their cheapest product; with an average seven-fold premium for the six study molecules among all companies who practice segmentation.

The result of these practices is that, for many commonly prescribed medicines, there are products on offer at price points that fit most family budgets (in addition to the free medicines that should be available to patients who have the paperwork, transportation options, and patience that allow them to access public health services).

Figure 2 shows the net pharmacy price (list price for selling in to pharmacies) for different brands of Amlodipine in the Indonesian market. Interestingly, branded products were available at all but the very lowest price points, allowing pharmacists to meet demand from poorer clients who equate branding with quality.

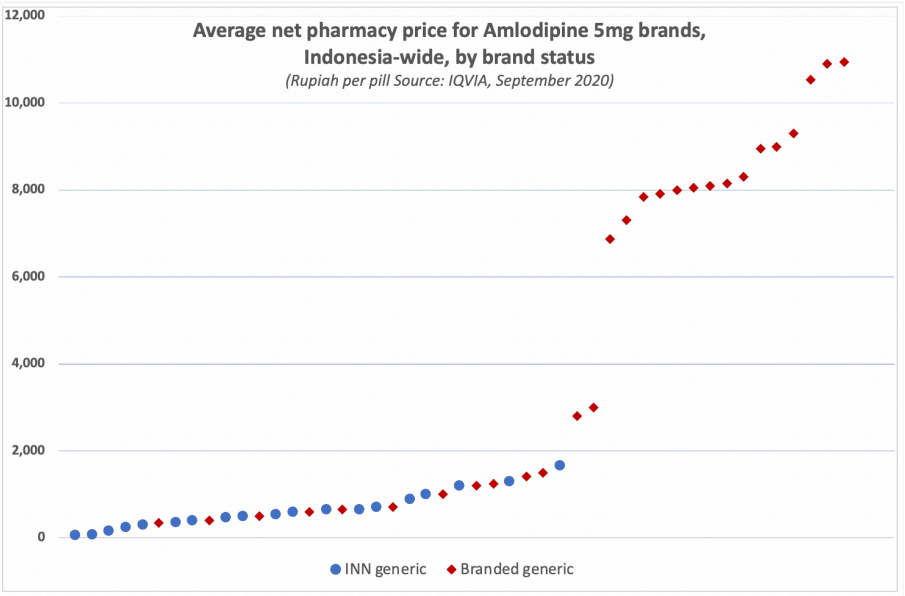

Figure 2

While these price differentials may be passed on to patients, there is some evidence that they are less significant earlier in the supply chain. Speaking of a product for which INN versions are currently in short supply, a hospital pharmacist said:

"[The branded version] is usually expensive on the regular market, right? But we negotiate, because you can get big discounts on branded products. In the end we drove them down so that it was almost the same price [as the INN] -- at most a difference of 200 or 300 rupiah."

-- Hospital pharmacist, Malang

Quality risks: There is no clear evidence that these segmentation practices produce specific quality risks besides those associated with the production of irrationally cheap medicines (a risk for substandard production and degradation), and the dangers associated with up-selling to very expensive brands (which increases risks for falsification).

1e) Up-selling

Practiced by: pharmacists, doctors, health care providers

Up-selling is a variation on market segmentation, practiced at the interface with the patient. It involves charging a patient (or insurer) for anything other than the most cost-effective product that meets the patient's therapeutic needs. This is implemented in a number of ways.

Up-selling 1) Non-provision of free medicines
Hospitals and pharmacies that are supposed to provide medicines to JKN patients for free will often report being out of stock of the public medicine. If an e-catalog product is out of stock, facilities that accept JKN patients are supposed to provide substitutes for free. Primary health centres often comply with this, if they have an alternative on hand. However, many hospitals and JKN pharmacies do not. Instead, they propose substitutes for which patients pay out of pocket. This is sometimes the case even when free medicines are in stock.

"When I was at the public hospital, there was one specialist doctor who would write prescriptions ... for branded medicines, even though we had a generic version in the hospital pharmacy. That was a [source of] conflict between me and the doctor. The patient was [insured by] JKN, they had a right to free medicine, so why go and buy medicine at 300,000 [rupiah]?"

-- Pharmacist, Public sector, TTS

Pharmacies providing medicines to JKN patients sometimes also sell the same products, sourced at e-catalog prices, to non-JKN patients, earning many times the amount they would get if reimbursed by the public insurer. As long as patients eligible for free medicines get them, this does not constitute up-selling. It become a problem only if the parallel sale to paying customers creates a shortage of the e-catalog product for the insured customers, meaning that they then have to switch brands, and pay out of pocket.

Table 8 shows the difference this makes to the bottom line; underlining the fact that maximising profits depends on finding the optimal combination of buying price, selling price, and sales volume.

Table 8: Sales data for different brands of Amlodipine 5mg, from a single pharmacy that serves JKN and non-JKN patients

	E-catalog INN, JKN patient	E-catalog INN, non-JKN patient	Best-selling branded	Most profitable branded
Buying price (from distributor)	75.5	75.5	2,000	6,500
Reimbursement/selling price	83	1,300	2,800	9,000
Profit per unit (rupiah_	7.5	1,224.5	800	2,500
Annual sales volume (2019)	46,000	28,000	200	170
Total profit	**345,000**	**34,286,000**	**160,000**	**425,000**

Up-selling 2): Prescribing by location
Many pharmacies are co-owned by doctors; in rural areas these include doctors who work in public health facilities. Besides prescribing branded medicines when free medicines are available, doctors will sometimes write prescriptions which direct patients to a specific pharmacy in which they have a financial interest, to buy medicines.

"[This doctor in the public hospital] writes pharmacy A, B or C right on the prescription. As I understand it, he has a collaboration [with the pharmacy]. If it's a private patient, fine, they can afford it. But don't do it to a [public insurance] patient who will have to borrow money to buy those medicines."

-- Pharmacist, Public sector, TTS

Up-selling 3): Prescribing or dispensing by brand
Prescription practices vary widely in Indonesia. 'Prescription only' medicines are commonly

sold without prescription. We did not have to provide a single prescription when buying over 200 samples of prescription-only cardiovascular medicines, while only a minority of pharmacists asked for a prescription for antibiotics. However, regulations do allow pharmacists to collect a small prescription fee for each medicine for which a prescription is used. This represents a potential for extra earnings. Many pharmacies maintain a relationship with one or more doctors who can be called upon to provide prescriptions (sometimes over the telephone). The financial arrangements around these relationships are flexible. There are no regulations mandating the use of INN names when writing prescriptions in Indonesia. Doctors commonly prescribe using brand names; it is clearly in the interests of the dispensing pharmacy if they recommend a brand with a high profit margin. If they have a direct financial interest in the pharmacy (as in Up-selling 2 above), or an ongoing relationship as a prescriber, it is also likely to be in their own interests. One pharmacists bemoaned the lack of prescriptions as a lost opportunity:

"We don't get that many patients coming with prescriptions, because we don't have any agreements with specialist doctors."

-- Pharmacist, Malang

While the Indonesian pharmaceutical industry's code of conduct on marketing forbids producers and distributors from paying or otherwise incentivising doctors to prescribe a brand,(GP Farmasi 2016) respondents reported direct and indirect encouragement to favour specific brands.

"If a doctor prescribes a branded product, the manufacturer will give them an incentive against the prescription."

-- Distributor, multinational

"It's the [pharmaceutical company salesforce] who do the promotion of a new product, meet their targets yes or no, get the bonuses. They look for doctors [to sign up], they do the negotiation... We distribute lots of cancer drugs, too. They introduce the drugs, tell [doctors] if you reach this target you get this bonus."

-- Distributor, national 1.

Deals with hospitals are also common.

"The business model to get medicines into hospitals is to make a deal. [The pharmaceutical company] has to give 15% of the sales price [as a kickback] to the hospital, and another 20% to the [prescribing] doctor. 10% is paid in cash monthly, and there's a 10% lump sum payment at the beginning. If it's a specialist doctor, it can be even more"

-- Hospital doctor, Malang

Data provided by the district hospital in one of our study areas indicated that while all JKN patients were provided with generic medicines, branded versions were also on offer for 'regular' clients. Over 40% of non-JKN patients needing Amlodipine 10mg were prescribed one of two branded versions, each priced over 70 times higher than the cheapest INN generic on the market.

Pharmacists and others also reported being incentivised to sell particular brands, not just on the basis of profit margins, but also because they could earn prizes, bonuses or discounts on stock by meeting certain sales targets.

"The sales people will offer some household appliance, like an oven or something like that. 'Ibu, take this many boxes of contraceptives for this many months, and you'll win this thing'."

-- Village midwife, Malang

"It's the [company] principals and distributors who offer: ... if you can sell 1000 packs, you'll get a reward... It's usually a TV, a fridge or a phone...From one [distributor], if we buy 10 million [rupiah worth of medicine-- about US$ 700], we'll get 3 million cashback, or a phone."

-- Pharmacist, TTS

This type of up-selling is possible because of the information asymmetry so often discussed in the case of medicines. Unlike recreational drugs, for which the link between quality and outcome tends to be immediately felt by the consumer, therapeutic medicines can act slowly, and be influenced by a number of factors such as the severity of disease or the susceptibility of pathogens. Actual verification of the quality of medicines is a specialised and expensive business. So people rely on other forms of signalling: advice (from doctors or health care providers, and sometimes from pharmacy sales staff) and price.

Because price is such an effective form of quality-signalling (conveying the perception of quality, regardless of actual quality), the demand for premium products often comes from patients themselves. Pharmacists reported that clients are proud to be seen to be doing the best for their families by demanding the most expensive brands, which we term *'obat gengsi*', or 'show-off medicines'

"[Even if we buy medicines at a large discount] we don't drop the selling price, because if it's too cheap patients don't trust the medicine, they think it's fake."

-- Pharmacist, Kupang

Pharmacists will take advantage of that, given the opportunity.

"We put the pharmacy management first. If a patient asks for paracetamol, we offer a branded version first. So that we're sure of making the most profit, if we give a generic, we'll give a vitamin combination, or if they've had fever, been tired, we'll sell them [herbal medicine] Imboost as well."

-- Pharmacist, TTS

A pharmacist described what she would do if a patient asked for Norvasc, the originator brand of amlodipine, made by Pfizer, which sells in the Indonesian market as Norvask at around 6 times the market median for similar products.

"If I don't have it, I suggest a substitution. Pfizer is expensive, right, so I have to find something that's around the same price point as Norvask... like, another branded product."

-- Pharmacist, Malang

Indonesians who have the right to free care (and medicines) through JKN are also prepared to pay for private medicines and outpatient care simply because it is so much more convenient to access than public services.

"We only sell to regular [market] clients, we don't have anything at [JKN] prices. But rather than queuing up for ages, [JKN patients] will come to buy their medicines at the pharmacy."

-- Pharmacist, Kupang

Quality risks: Falsifiers look for opportunities to maximise earnings, while minimising the risk of getting caught. Premium items produced by companies that do not have the large international security forces maintained by many large multinational research-based firms but have strong brand recognition in the local market are thus attractive targets. Sale outside of the regulated supply chain provides extra protection against discovery and prosecution; in the

Indonesian system this includes sale by doctors who are boosting their income by selling directly to patients (which is not strictly permitted). The prescription of expensive products in order to meet personal or institutional incentive targets may also encourage patients to save on pharmacy prices by buying the brand at a discount online or in informal markets. This provides criminals with easy entry points for falsified medicines.

1f) Differential pricing

Practiced by: distributors, pharmacists, health care providers

The over-riding principle of medicine sales in Indonesia seems to be to charge whatever the market will bear.

In addition to choosing which product to recommend according to the actual or perceived buying power of the patient, we found evidence that distributors, private clinics and physicians vary margins according to the product type and level of competition in the market, and also adopt flexible pricing for each brand, often selling the same product at different prices.

"For brands that you find everywhere [names several well-known brands], every pharmacy has them, and will be getting them at roughly the same price, do you don't want to add too much [profit margin]. But for other things, medicines that are not fast-moving, you might add more than 20%. So it's really up to you; 15%, or perhaps 20 or 25. Me, I usually stop at 20 or 25, I don't go up to 30."

-- Pharmacist, Malang

In the case of distributors, prices vary with volume and payment record. In vertically integrated firms, distributors may sell at preferential prices to their own retail chains. For example, we found that one distributor charged the local public hospital a premium of 160% over the price they charged to their group's retail pharmacy for the same INN product.

At the patient level, apparently better-off clients are charged more; the extra margin they pay sometimes subsidises lower prices for poorer clients. Pharmacists described implementing this variation by "rounding up" to the nearest 10,000 rupiah mark if the patient seemed able to afford it. If the medicine was sold against a prescription, they may also vary the prescription fee.

"So lets say a doctors writes a prescription for 3 medicines which together cost 8,000, we'll round it to 10,000.... But if the nominal [price] is 11,000, we'll round to 20,000."

-- Pharmacist, TTS

Doctors selling on their own account mostly provided branded products, and charged among the highest prices in our pricing survey -- demanding a premium of up to seven times the lowest price recorded for the same brand in the survey area.

Figure 3 shows the variation in prices charged for the identical product in a single market area, together with the national average net pharmacy price for the same product. Several of the prices fall well below the reported net pharmacy price, suggesting that in these cases pharmacists (or health care professionals) acquired the products at a substantial discount.

Differential pricing also operates at the level of a whole pharmacy, with some outlets signalling quality of their whole operation by charging higher prices than competing retailers. Broadly speaking, Indonesia has four types of pharmacies: those in hospitals or health centres, independent pharmacies, national chain pharmacies, and franchised chains.

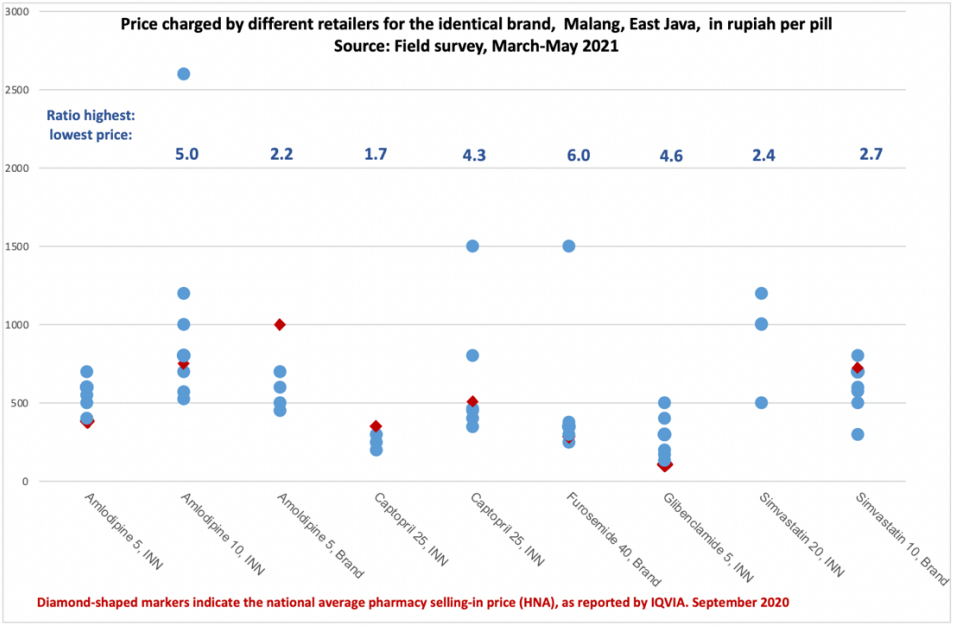

Figure 3

National chain pharmacies tend to invest substantially in standardisation of infrastructure and operations, meaning they likely have higher costs per sale than many independent pharmacies. Many procure centrally, including from the state-owned or private pharmaceutical producers with which they are horizontally integrated. Although they thus benefit from economies of scale in purchasing, they typically charge more, across a range of products, than smaller independent pharmacies. This is probably partly a quality-signalling strategy, and partly to recoup real costs associated with quality assurance.

Table 9 shows the price variation between chain pharmacies and other retailers, for a variety of identical products captured in our field survey, as well as the national average net pharmacy buying in price, from IQVIA data.

Table 9: Same product, different pharmacies: quality signalling by outlet

	INN A Amlodipine 5mg		Brand B Amlodipine 10 mg		Brand C Amoxicillin 500		Brand D Simvastatin 10	
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
Chain pharmacy Location A	76	1,300	NA	NA	3,200	4,450	5,380	6,650
Chain pharmacy Location B	76	1,200	8,125	15,245	Unknown	4,400	6,000	6,600
Other pharmacies*	Unknown	300	Unknown	12,650	Unknown	4,000	Unknown	5,440
Average net pharmacy price	492		9,293		2,883	3,232	3,537	

*Price is the cheapest offered by any other pharmacy or health provider in either area

Other national chains operate on a franchise model, using a single brand identity for their store (signalling familiarity and reliability to clients), but with less emphasis on standard operational procedures. Procurement at franchise outlets is often undertaken by the pharmacists in charge, rather than centrally.

Quality risks: To the extent that those practicing differential pricing accurately assess the ability of the client to pay, it seems unlikely that the selective setting of high prices by some sellers has any significant impact on the quality of medicines. The risks occur if a patient is charged more than they can afford, in which case they may choose in future to go without medicine, or to source it from unregulated outlets.

1g) Sourcing of products at a discount

Practiced by: pharmacists, hospitals

In Section 1b, we described the sourcing of irrationally cheap products, made necessary by the need to avoid losses related to reimbursement in the public system. However private pharmacists and others who interface with patients are also incentivised to source cheaply simply in order to maximise their profits. The mechanisms are much as described under 1b. In addition, pharmacists very frequently describe their choice of products as being influenced primarily by the depth of the discount offered. Both pharmacists and distributors describe three principal factors determining the discount: a vigorous programme of special promotions from producers; the size of the order; and the proximity of the expiry date. These are related to the loss-minimising actions taken by producers described in 1a. Promotions may also centre on new product offerings.

"I sometimes switch distributors if they are offering, maybe a bigger discount, then I'll take that, as long as it's profitable [laughs]... Or if a principle [a sales representative direct from the market authorisation holder] comes -- it's them that bring the promotional programs, if you buy this much, you get a discount of that much..."

-- Pharmacist, Malang

Volume discounts can be substantial. One chain pharmacy reported an additional 29% discount from a distributor providing 40,000 units of a specific INN medicine, compared with the price secured from a different distributor who supplied only 9,000 units of the identical medicine (same brand and dose-form). Since the pharmacy sells the product at the same price regardless of source, this has a considerable influence on revenue.

Another pharmacist reported that many private companies were able to provide INN products at prices that were half or less of the prices offered by large state-owned companies, because of a combination of lower production costs and more flexible discounting:

"The [state-owned companies] have higher production costs, maybe because of their choice of active ingredients, and the negotiations with private distributors happen at the highest levels, so it is harder for [us at] lower levels to negotiate [discounts], see."

-- Panel pharmacy, Kupang

Quality risks: Similar to those described under 1a and 1b. In addition, discounts related to bulk ordering may incentivise over-stock, leading to degradation and/or returns, feeding back into the risks associated with product expiry. They also feed the tax avoidance practices described under 1h.

1h) Tax avoidance

Practiced by: smaller pharmacies

When pharmacies buy medicines from a registered distributor, they pay 10% VAT. This can be reclaimed if the sale to the patient is then reported to the tax authorities. However, repayment is often very slow, with arrears of over 12 months commonly reported. An (illicit) alternative is to buy at retail prices from a large pharmacy. Large pharmacies with high turnover benefit from very substantial bulk discounts, meaning that they can sometimes sell to other pharmacies at prices equivalent to, or lower than, those offered by smaller local

distributors. Because there is no VAT record of sale (*faktur*) between pharmacies, the acquiring pharmacy can sell on to the patient at the usual price, without having to charge VAT, engage in the associated paperwork, or wait for refunds. The additional discount they can obtain from high volume pharmacies more than compensates for not being able to reclaim 10% VAT on sales. This practice is illegal (and assumes that the patient does not require a VAT certificate). It is, however, common enough to have a name: '*putihan*' -- similar to 'whitewashing'. The pharmacies that order at high volume and flip products to other pharmacies are known as '*panel*' pharmacies.

Quality risks: Because the practice is illegal, it interrupts the paper trail which links a product back through the distribution chain to the manufacturer. This potentially facilitates the entry of falsified products, and obstructs tracking and recall of products that are substandard or expired.

1i) Supplying under-served markets

Practiced by: private traders

Many communities in Indonesia are too small or too remote to sustain a pharmacy. According to the 2018 village census, 26% of villages nationally have no pharmacy, and no even moderately easy access to one; that's 21,532 villages without reasonable access to a pharmacy. In TTS district, nine of the 10 pharmacies are crowded into the district capital which is home to just 9% of the district's population; the remaining 91% of the population is scattered over an area of close to 4,000 km2, which has just one pharmacy.

While every sub-district has a health centre, stockouts are common, for the reasons described in this report. This creates a market opportunity for enterprising private traders, who buy in bulk from distributors or pharmacies who are willing to sell to clients who are not licensed to handle medicines. These traders tour remote villages, selling their wares at periodic markets or to roadside stall-holders, often out of the back of a *'mobil boks'* (box car).

"The distributors used to take the medicines to markets but they've changed [their way of working]. Now they deliver to the traders' home, or to some drop point. The traders are from Soe town, they mostly sell groceries. They go around in their mobil box, and sell [the medicines] in the weekly markets."

-- Police investigator, TTS

Quality risks: This last-mile supply steps outside the regulated supply chain, potentially facilitating the entry of falsified products. In addition, it often involves transportation of cheap brands of medicines across large distances in high temperatures, using motorbikes or trucks not designed to protect medicine quality. The likelihood of degradation is thus elevated.

2 Institutional, bureaucratic and professional incentives

Companies, bureaucracies, politicians and individuals are also incentivised by factors other than money. Examples include pride (for example the desire to maintain a good reputation), influence (for example the desire to influence policy, or to be elected, appointed or promoted to a position or power), and general well-being (for example the desire to run a sustainable business, or to achieve a balance between work, family, and leisure). The actions resulting from these incentive structures have implications for the handling, pricing and quality of medicines.

2a) Avoidance of risk and nominal compliance

Practiced by: pharmacists, including in health care facilities; bureaucrats

Several pharmacists reported taking steps to maintain their reputation by refusing to accept discounted products with short remaining shelf life; by turning down opportunities to engage in illicit but widespread practices such as whitewashing; and by otherwise ensuring due diligence.

An additional form of risk-avoidance involves avoiding the risk of sanctions through only nominal compliance with regulations, especially those governing sale and dispensing only through registered premises with qualified pharmacists.

Every Indonesian pharmacy is obliged to have a qualified pharmacist in charge of procurement, handling of medicines etc. This is supposed to ensure that good pharmaceutical practice is followed. A single pharmacist is allowed to take charge of up to three pharmacies. In reality, business people often pay pharmacists to use their names on a license (a practice known as '*pinjam nama*' or borrowing a name). There is no expectation that the pharmacist will work in the location or provide any oversight that might assure quality. (The failure to employ a licensed pharmacists on premises is also a way of cutting costs and thus maximising profits for the business owner.)

Individual health care providers, or practices without qualified pharmacists, are not permitted to sell medicines. This regulation is so widely flouted that the industry has structured a work-around, using 'panel' pharmacies. A (non-panel) pharmacist explained:

"It's the doctors who benefit, because they get stuff at a lower price. If they bought from a [normal] pharmacy like mine, we'd usually take a margin of 15-20%, but at a panel pharmacy, the principal [market authorisation holder] only allows the pharmacy a margin of 5 or 10%, then you just pass the medicines through to the doctors, and that's where the doctors make their money....I've been asked to do it, but ... it's still us that has to pay the taxes, and that's getting tighter and tighter. I think the that pharmacists are the ones that lose out, so I turned down the offer."

-- Pharmacist, Malang

In the bureaucracy, risk-avoidance is more pervasive and more complex. Many public sector health workers fear being audited or otherwise held responsible for any deviation from prescribed procedures, even when those procedures don't match local conditions or needs across Indonesia's hugely diverse settings. This discourages flexibility and proactive problem-solving, such as the use of capitation funds to re-stock medicines before existing stocks are exhausted. "*Tidak berani*" -- "I wouldn't dare" is commonly given by public sector health providers as a reason for not acting more proactively.

"The biggest problem is when [the national procurement agency] LKPP can't find a winner, because the profit is too small or whatever... Like, in 2019, there was no paracetamol, ibuprofen, asemefenamat, really essential medicines [offered through e-catalog]."

Interviewer: *"So did you procure those directly?"*

"No, we didn't dare, because according to the system, we were supposed to use e-catalog...Eventually we met with [the State Audit Board] BPK to come to an agreement... and from this year we are doing direct purchasing.

Interviewer*: "So in those two years, if [an essential medicine] wasn't available on e-catalog, where did you get it procure it from?"*

"We just didn't buy it."

-- District health office staff, Malang

In TTS district, stock-outs at the district medicine warehouse were reported to be common. According to distributors this was largely because of non-payment of previously-incurred debts, though risk-aversion ("by-the-book" verification practices) at distributors also played a part. Under-trained procurement staff reported struggling with all of the electronic paperwork required by e-purchasing systems, contributing to unfulfilled orders from the district health office.

"We stick very closely to the system..."

-- Distributor, national 1

If the district warehouse shelves are empty, orders from primary health centres (*puskesmas*) are not fulfilled. Yet puskesmas staff chose not to use capitation funds to buy medicine, as permitted by national guidelines, because the status of implementing regulations from the local health department remained unclear.

As a result, patients who were entitled to free medicines were sent away with a prescription that they had to fill at their own expense.

"We're supposed to be able to use capitation funds up to a million [rupiah per month, about US$ 70] to buy medicines that are out of stock but we don't. I think it's because the district health office is confused, and doesn't dare give us a clear decision about procurement... It's really a shame for the local population, because I have to write out a copy of the prescription, and then they have to spend 6,500 for the medicine, and another 10,000 for transport. It's so inefficient. [sighs]."

-- Pharmacist, Public sector, TTS.

This may work against the interests of health centre managers, to the extent that it leads to public dissatisfaction with services, which can have repercussions in local elections. However individual doctors may benefit. It is common (and permitted) practice for puskesmas doctors also to operate a private practice. Although they are not technically permitted to sell medicines from this practice, many profit from doing so. Rather than leave the free puskesmas service empty-handed, some patients prefer to pay a fee to see the same doctor out of hours, knowing that they will be able to secure medicines. Risk-aversion which obstructs flexibility thus simultaneously creates opportunities for a variation on the 'up-selling' practices described in 1e).

Senior staff who do dare to break the rules are, meanwhile, relatively safe because those most likely to know about the violations -- their colleagues and juniors -- do not want to blow the whistle, knowing that they put at risk their chances of promotion or assignment to a desirable location. For example, the pharmacist who complained to the specialist doctor about up-selling JKN patients to branded medicines reported being rotated to a remote health centre shortly thereafter.

Quality risks: Risk aversion on the part of working pharmacists-in-charge may raise prices charged to patients, but it also likely reduces the risks to quality by maintaining a clear and verifiable paper trail, and allowing for rapid recalls if necessary. On the other hand, to the extent that the active involvement of a licensed pharmacist assures compliance with Good Pharmaceutical Practice, the act of 'name-borrowing' may reduce oversight and increase the likelihood of poor quality or expired products being procured or sold.

When it is practiced in the public sector, risk aversion may encourage shortages, and the threats to quality that those entail (see 1c), as well as those associated with unethical procurement or up-selling practices (1b and 1e respectively).The provision of medicines by

doctors in private practice involves dispensing outside of the regulated supply chain, increasing opportunities for the introduction of poor quality medicines.

2b) Avoidance of bureaucracy

Practiced by: health care workers

Some supply chain actors buy out of the regulated supply chain more to circumvent bureaucratic regulations than to get low prices. This is especially true of health care providers, who are not technically allowed to buy from pharmacies.

"I have friends who buy from Pasar Pramuka [a Jakarta medicine market reputed to sell many falsified products]"

Interviewer: *"Because it's cheaper?"*

"No, because it's less of a headache [tidak ribet]; no-one asks lots of questions if they want to buy in bulk, like we would if they came to the pharmacy... In a place like that it's so much easier, they point to something and they get it."

-- Pharmacist, TTS

Quality risks: Increases the likelihood of purchases in the unregulated supply chain and disincentivises due diligence, which increases the risk of falsified medicines entering the supply chain. Even in the regulated supply chain, steps taken to sidestep bureaucracy can interrupt proper documentation, and make tracking and recall difficult.

2c) Target-driven behaviour

Practiced by: producers, distributors, public health care workers, bureaucrats

Marketing staff at pharmaceutical companies and sales staff at distributors are often evaluated, rewarded and promoted based on their ability to meet sales targets. Since product returns are not commonly docked from their achieved targets, this incentivises the sales of large volumes, potentially leading to overstocking and degradation, while facilitating repackaging or deep discounting of products approaching expiry.

"We get given financial targets, lets say 100 million a month, which we have to shift to our designated channel, hospital or pharmacy."

-- Distributor, multinational

District health offices often set quantitative performance targets for health centres and staff, rewarding those centres that achieve targets, and/or sanctioning those that don't. These targets are not always in line with actual needs, and they sometimes result in perverse incentives. One village midwife described the effect of a target to minimise the volume of medicines which have to be returned because of impending expiry.

"Sometimes the health centre gives us medicines that are almost expired. Like this: sometimes they'll give me medicines which are expiring in July, but they'll only give them to me in May, so then we're forced to just give out a whole lot to pregnant women, a lot that aren't too long until expiry. We'll return the expired ones to the puskesmas, but I don't know how they dispose of them. In the records, we won't report any expired medicines... I will report they have been handed over to patients A, B and C. "

-- Village midwife, Malang

This target-driven behaviour interacts with the avoidance of bureaucracy, mentioned in 2b above. Public servants reported being strongly disincentivised to return expired medicines because of the paperwork involved in disposal of state-owned assets.

"When I worked [in a ministry health department], we would frankly just report we had used expired medicines, and throw them away, to avoid the headache of trying to return them."

-- Pharmaceutical company representative

The behaviour of staff at the medicine regulator is also shaped by 'key performance indicators'. In some cases, these may work against the best interests of patient safety. For example, targets which set a maximum threshold for poor quality products (currently reported to be 1%) may disincentive active, risk-based surveillance of products known to be at highest risk, or sampling at points in the supply chain where poor quality products are most likely to be found, reducing the risk of detection, and potentially allowing more poor quality medicines to reach patients.

Quality risks: Target-driven behaviour is varied, and can enlarge many of the effects described elsewhere in this report. One example comes from the non-reporting of expired products (which doubles as a way of avoiding bureaucracy). Because demand planning is based on past consumption, the reporting of expired (and unused) medicines as consumed leads to over-ordering for the next year. This in turn leads to over-production, and to dumping as described in 1a, with the associated risks to medicine quality.

3 Health-related incentives

Last and probably least, some supply chain actors are motivated at least in part by the desire to maximise health gains to patients. This motivation affects pricing, but also informal distribution at the end of the supply chain.

3a) Generic substitution

Practiced by: pharmacists

A few pharmacists in the study reported trying to challenge patient perceptions that INN generics are of poor quality. One described their efforts to dissuade doctors from prescribing branded products to public patients.

"If specialist doctors say their reason for prescribing a branded medicine [instead of the INN generic that is available for free] is that it's better quality, then, I told him, let's write to the Minister of Health and complain, so that all the [INN] generics are pulled off the market. Let's all complain: Hey, Mr Minister, you're giving us flour pills, not medicine.' I couldn't change the doctors' mind, but me, [in the hospital pharmacy], I substituted generics."

-- Pharmacist, Public sector, TTS

Quality risks: This has the effect of reducing costs to patients, and reducing the likelihood that they will buy medicines from unregulated sources. As long as the generics available in the public sector are quality assured, including through good distribution practice, this represents a net benefit to patients.

3b) Informal distribution

Practiced by: health care providers

In remote areas, extension workers such as village midwives are often the first port of call for those in need of treatment. Health workers buy medicines when they visit town, then re-sell them to patients in rural areas who do not have access to pharmacies or well-stocked health centres. The role is similar to that of traders described in 1h, though the motivation of rural health workers is often as much to meet patient needs as to make money. Because patients in remote rural areas tend to have limited access to cash, these health workers will source medicines as cheaply as possible, while still trying to fulfil patient expectations for "quality" products.

Among the health workers from whom we bought samples, village midwives were far more likely to charge low prices than doctors, especially when they were selling branded products. Indeed, one midwife sold products at a 50% discount even to the retail price that we paid in the pharmacy from which the midwife herself bought her stocks. (The few that provided INN generics, on the other hand, tended to charge over the odds for them -- perhaps as part of their efforts to signal quality).

In Malang, 23 out of 31 products we bought from health workers were sourced from the same pharmacy, well known for selling in bulk to health care workers and *'mobil box*' traders.

Everyone knows the place. There's the official shop in the front, and then right next door, around the back, there's a sort of warehouse where I used to go and pick up my medicines, along with the long line of mobil boks drivers. Now, you can just order by WA [WhatsApp] and they will drop to you. Maybe that is where they keep more dodgy stuff, around the back.

-- Former rural doctor, Malang

Quality risks: As described in 1a, 1b and 1g.

Conclusion

Summary findings

There are too many actors, motivations, regulations and deviations from regulated practice in the Indonesian pharmaceutical supply chain to allow us to characterise any pathway, discount, distribution or profit margin as 'typical'. The difficulty is compounded by the COVID-19 pandemic, and partial reforms in the health system. This meant the market was exceptionally dynamic at the time of data collection in 2020/2021, so it is difficult to distinguish between structural and temporal factors.

This study does, however, provide a number of useful insights. We summarise these here, and follow with a discussion of policy implications.

Interaction between supply chain regulation and the market

De facto practices differ very substantially from those expected by *de jure* regulations governing the supply chain. We believe this is principally because medicine regulators are trying to protect the physical quality of the medicine, while supply chain actors are, for the most part, trying to protect profit margins (or in the case of the public sector, budgets).

Though the medicine regulator governs entry to the market (through product authorisation) and mandates printing on product packaging of the maximum sales price suggested by the manufacturer, it has virtually no power to regulate the market itself, and no input into the way ceiling prices for tenders and maximum sales prices are set.

The market is governed by the pursuit of profit, which is a powerful force. Any quality-protecting regulation which threatens profit margins is likely to result in a work-around which either promotes revenues or reduces costs. For example, rules which require companies to assume the cost of destroying expired medicines incentivises shifting stock into the market shortly before expiry, at deep discounts. Rules which require distributors to sell only to pharmacies or health facilities with a pharmacist-in-charge deprive doctors, nurses and midwives, who provide care for a large proportion of Indonesians in rural areas, of access to quality-assured medicines at the lowest prices. This results in parallel distribution through 'panel' pharmacies; sourcing from unregulated outlets; higher prices for patients; or untreated illnesses.

Knock-on effects

Supply chain: the clue is in the name. The behaviour of each actor (and the incentives that shape that behaviour) will in turn affect the decisions taken by other actors in the chain. The behaviours with the greatest power to shape market outcomes are those which align with the incentives of the actor downstream. But poorly aligned incentives may also impact quality.

A distributor who wishes to protect profits by dumping overstocked products close to their sell-by date will sell cheaply. Since most traders want to buy cheaply, incentives are aligned, that distributor will find a ready market, and the products will flow easily through the supply chain. This potentially allows substandard products to reach patients easily.

Poorly aligned incentives are more likely to disrupt the supply of goods. For example, reputable distributors will be unwilling to supply a client who is known to be slow to pay. The incentives of the distributor (loss protection) and the client (acquisition of stock) are misaligned; a well-governed distributor will stop the flow of products to a poorly governed client. This may initiate a "race to the bottom", incentivising the client to buy from ill-governed or unregulated sources, and facilitating the introduction of falsified products.

Governing diversity

In largely decentralised Indonesia, the medicine supply chain is subject to regulations set at the national level. While this is probably necessary to avoid confusion, it is extremely difficult to envisage a single set of regulations which would be ideal for all contexts across a country as diverse as Indonesia. Something that is desirable and feasible in a densely populated area rich in health services and close to medicine producers may not be feasible, nor indeed desirable, in remote areas with limited access to formal health services.

When supply chain actors stick too closely to regulations designed to protect product quality, but that are not appropriate to the local context, the result can be to deny patients any medicine at all. As a result, even supply chain actors who are hoping to maximise equitable access to necessary medicines (rather than simply to squeeze out more profits) develop work-arounds or simply ignore regulations. In this case, pragmatic regulators may choose not to enforce rules too diligently. Though we have no strong evidence for this, it is also likely that the districts or areas most in need of regulatory flexibility overlap considerably with the areas where the regulator has least capacity to effectively enforce regulation. If that is true, selective lack of enforcement may be more a happy coincidence than an active choice on the part of a pragmatic regulator.

Acceptable price variation

The extreme diversity of prices for similar or identical medicines in the Indonesian market may appear to be a cause for concern, raising questions about quality at the low end and concerns about price-gouging at the high end.

In fact, the "what the market will bear" approach is not necessarily detrimental, as long as it amounts to an effective cross-subsidy. If the sale of 'show-off medicines' to those who can afford them makes money for pharmaceutical companies that they then channel back into producing quality generics for the public system, the net outcome for the health of Indonesians, as well as for the financial health of JKN, may be positive. The same is true of health professionals: if they subsidise under-compensated work for poor patients by charging rich patients for medicines which increase their income (including through incentive schemes), little damage is done.

The problem for patients, and in the longer term national budgets, occurs if none of the profits extracted from those most able to pay are ploughed back into effective subsidies to support the manufacture, distribution or dispensing of affordable, quality-assured medicines to poorer patients. If the pressure to maximise profits is absolute, companies or health service providers will extract maximum value from those able to pay by selling them expensive products, without also ensuring that affordable, quality-assured products are consistently available and on offer to poorer patients.

Non-financial incentives

It's not all about money. Other factors -- including maintaining corporate reputation and a genuine desire to improve health -- also shape behaviours in the supply chain. In the public sector, the most important of these is probably institutional incentive structures. Performance-based incentives are currently fashionable in policy circles, including in Indonesia. This requires measurable outcomes, and often involves setting targets. These targets sometimes have unintended consequences, which actually reduce the ultimate goal of patient well-being and population health.

Policy implications

Work across institutions to reduce root causes of poor quality

The factors described in this report affect the quality of medicines once they are in the supply chain. But the factors which determine the volume and quality of medicines which enter the supply chain play a very important part in determining overall product quality.

Deviations from good practice in the supply chain are more likely to result in degradation when medicines are manufactured around the borderline of acceptable quality. This, in turn, is determined in large part by pricing and procurement policies. Similarly, many of the practices described in this report are shaped by the sheer volume of products on the market. And the volume, at least in Indonesia's vast public sector, is strongly influenced by demand planning.

Neither pricing and procurement policies nor demand planning are the responsibility of the medicine regulator. But more accurate demand planning would reduce the likelihood of either over-supply and consequent dumping of lower priced products, or of shortages which create openings for falsified products. Meanwhile, procurement policies which factor quality in to the bidding process and which build in safeguards against production and supply failures would reduce incentives to cut costs associated with quality assurance, and similarly protect against shortages.

Such reforms are out of scope for the regulator; they would have to be undertaken by the Ministry of Health and the national procurement agency, likely with the support of JKN's administrator and the Ministry of Finance.

Additional supply chain regulation: think first

When threats to medicine quality are identified, a common response is to call for more regulation, usually accompanied by efforts to strengthen the medicine regulator. Our study suggests that more regulation of the supply chain would not be a useful response in Indonesia. The regulator is competent, and has put in place regulations that are well designed to ensure the quality of medicines throughout the supply chain. But these measures may create another problem: they may constrain profits; and supply chain actors may react by taking other actions, very often related to pricing, which ultimately threaten product quality somewhere else in the supply chain, as described in this report. The medicine regulator has limited authority to govern pricing; indeed it might present a significant conflict of interest if it did.

Rather than issue more rules, Indonesian authorities (or academics) might undertake a careful analysis of the market implications of existing regulations -- looking at the impact that each has on the profit margins and other incentives governing the behaviour of supply chain actors. (Our study did not seek to undertake a regulatory review, but much of the data could be re-used to contribute to such an analysis.)

Enforcement of existing supply chain regulations: be pragmatic

More careful consideration should also be given to contextual diversity, and to the potential negative externalities of stringent enforcement of regulations designed to protect the quality of medicines throughout the supply chain. Ideally, analysis should have as its end goal not the quality of the medicine itself, but patient outcomes. If the stringent enforcement of a regulation means the patient is left with no medicine at all, or has access only to medicines sourced from the unregulated supply chain, pragmatic alternatives or flexible enforcement may be desirable. It also seems undesirable to punish actors for taking legitimate steps to protect their interests and the long-term sustainability of their business, such as refusing to deliver medicines to clients who are many months in arrears in paying for previous deliveries.

One possibility is to consider an algorithmic approach to regulation. For example, sanctions may be imposed on distributors who fail to supply clients, only if those clients can show that they have a record of on-time payment. If a distributor can show a client is in arrears, they would not be sanctioned for non-delivery.

Performance indicators and institutional incentives: consider perverse outcomes

Performance indicators and institutional incentives affecting facility or company ranking, personal promotion, or other forms of non-financial incentives should (like regulations) be scanned for potential perverse outcomes. Key performance indicators governing the health regulator and public health facilities should be particularly careful scrutinised. Again, an algorithmic approach to evaluation is possible: for example, an indicator for percent of products meeting quality standards would only be considered valid if an indicator of correct implementation of risk based surveillance were also met.

The research team

The research was conceived, led and overseen by Elizabeth Pisani. Relmbuss Biljers Fanda managed the study, carried out a literature review and collected data in NTT. Aksari Dewi collected data in Malang, as part of a study funded by NHMRC. Amalia Hasnida contributed the secondary market data she is analysing as part of a fellowship sponsored by the USP Quality Institute. Yunita Nugrahani and Rhami Mawaddati participated with all other team

members in weekly study discussions between March 2020 and June 2021. All contributed actively to analysis, and to shaping this report.

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